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(54) **TRISPECIFIC AND/OR TRIVALENT BINDING PROTEINS**

(57) The disclosure provides trispecific and/or trivalent binding proteins comprising four polypeptide chains that form three antigen binding sites that specifically bind one or more target proteins, wherein a first pair of polypeptides forming the binding protein possess dual variable domains having a cross-over orientation and

wherein a second pair of polypeptides forming the binding protein possess a single variable domain. The disclosure also provides methods for making trispecific and/or trivalent binding proteins and uses of such binding proteins.

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EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	ANKE STEINMETZ ET AL: "CODV-Ig, a universal bispecific tetravalent and multifunctional immunoglobulin format for medical applications", MABS, vol. 8, no. 5, 16 March 2016 (2016-03-16), pages 867-878, XP055343765, US ISSN: 1942-0862, DOI: 10.1080/19420862.2016.1162932 * page 867, right-hand column, last paragraph - page 868, left-hand column, paragraph 1; figure 2; table 1 * * page 870, left-hand column, paragraph 2 * * page 870, right-hand column, last paragraph * * page 871, right-hand column, paragraph 1 * * the "Discussion" section; page 869, right-hand column, paragraph 1 * -----	1-17	INV. C07K16/24 C07K16/28 C07K16/32 A61P35/00 A61P29/00 A61K39/00 C07K16/46
			TECHNICAL FIELDS SEARCHED (IPC) C07K A61K
A	Anke Steinmetz ET AL: "CODV-Ig, a universal bispecific tetravalent and multifunctional immunoglobulin format for medical applications Supplementary Materials", , 16 March 2016 (2016-03-16), XP055407738, Retrieved from the Internet: URL: http://www.tandfonline.com/doi/suppl/10.1080/19420862.2016.1162932/suppl_file/kmab_a_1162932_sm2538.docx [retrieved on 2017-09-19] * figure S2; table 1 * ----- -/--	1-17	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 December 2023	Examiner Hix, Rebecca
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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5

10

15

20

25

30

35

40

45

1

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2014/116846 A2 (ABBVIE INC [US]) 31 July 2014 (2014-07-31) * page 31, last paragraph - page 32, paragraph 2; figures 9-14; examples 9-11; sequence 23 * * page 17, paragraph 2 * -----	1-17	
A,D	WO 2012/135345 A1 (SANOFI SA [FR]; BAURIN NICOLAS [FR]; BEIL CHRISTIAN [DE]; CORVEY CARST) 4 October 2012 (2012-10-04) * page 26, line 26 - page 28, line 28; tables 7,8,13 * * page 54, line 9 - line 12 * -----	1-17	
A	AN WILLEMS ET AL: "CD3 CD28 cross-interacting bispecific antibodies improve tumor cell dependent T-cell activation", CANCER IMMUNOLOGY, IMMUNOTHERAPY, SPRINGER, BERLIN, DE, vol. 54, no. 11, 1 November 2005 (2005-11-01), pages 1059-1071, XP019333076, ISSN: 1432-0851, DOI: 10.1007/S00262-005-0671-8 * abstract * -----	1-17	TECHNICAL FIELDS SEARCHED (IPC)
A	SONG LI-PING ET AL: "A NEW MODEL OF TRISPECIFIC ANTIBODY WITH CYTOTOXICITY AGAINST TUMOR CELLS", SHENGWU HUAXUE YU SHENGWU WULI XUEBAO - ACTA BIOCHIMICA ETBIOPHYSICA SINICA, SHANGHAI KEXUE JISHU CHUBANSHE, SHANGHAI, CN, vol. 35, no. 6, 1 June 2003 (2003-06-01), pages 503-510, XP002388106, ISSN: 0582-9879 * abstract * ----- -/--	1-17	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 December 2023	Examiner Hix, Rebecca
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	



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5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 378 520 A1 (INST GENETICS CAS [CN]; BEIJING ABT GENETIC ENGINEERIN [CN]; DONGGUANG) 7 January 2004 (2004-01-07) * abstract *	1-17	
A	EP 1 736 484 A1 (BEIJING ABT GENETIC ENGINEERIN [CN]; DONGGUANG HAOFA BIOTECHNOLOGY [CN]) 27 December 2006 (2006-12-27) * abstract *	1-17	
A	X.-B. WANG: "A New Recombinant Single Chain Trispecific Antibody Recruits T Lymphocytes to Kill CEA (Carcinoma Embryonic Antigen) Positive Tumor Cells In Vitro Efficiently", JOURNAL OF BIOCHEMISTRY, vol. 135, no. 4, 1 April 2004 (2004-04-01) , pages 555-565, XP055132180, ISSN: 0021-924X, DOI: 10.1093/jb/mvh065 * abstract *	1-17	
A	WO 2011/154453 A1 (GENMAB AS [DK]; WEERS MICHEL DE [NL]; WALSETH TIM [US]; WINKEL JAN VAN) 15 December 2011 (2011-12-15) * page 73, paragraph 1 *	1-17	
A	SPIESS CHRISTOPH ET AL: "Alternative molecular formats and therapeutic applications for bispecific antibodies", MOLECULAR IMMUNOLOGY, PERGAMON, GB, vol. 67, no. 2, 27 January 2015 (2015-01-27), pages 95-106, XP029246892, ISSN: 0161-5890, DOI: 10.1016/J.MOLIMM.2015.01.003 * table 1 *	1-17	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search The Hague			Date of completion of the search 6 December 2023
Examiner Hix, Rebecca			
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
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EP 23 17 9697

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	WO 2017/074878 A1 (SANOFI SA [FR]; THE USA AS REPRESENTED BY THE SECRETARY DEPT OF HEALTH) 4 May 2017 (2017-05-04) * claims; figures 8A, 8B; examples; sequences 479-496, 509-511, 522-524 *	1-17	TECHNICAL FIELDS SEARCHED (IPC)
A	WO 2015/149077 A1 (XENCOR INC [US]) 1 October 2015 (2015-10-01) * page 76, paragraph [0340] - page 79, paragraph [0360]; claims; figures 38, 38, 53 *	1-17	
A	Gregory Moore: "Tuning T Cell Affinity Improves Efficacy and Safety of Anti-CD38 x Anti-CD3 Bispecific Antibodies in Monkeys - a Potential Therapy for Multiple Myeloma", 5 December 2015 (2015-12-05), XP055258267, Retrieved from the Internet: URL:https://ash.confex.com/ash/2015/webprogram/Paper78382.html [retrieved on 2016-03-15] * the whole document *	1-17	
A	WO 2009/149189 A2 (ABBOTT LAB [US]; GHAYUR TARIQ [US]; ISAKSON PETER C [US]; OLSON LISA M) 10 December 2009 (2009-12-10) * claims; sequences 32, 33 *	1-17	
A	US 2010/226923 A1 (RAO ERCOLE [DE] ET AL) 9 September 2010 (2010-09-09) * page 1, paragraph [0002] - paragraph [0010] *	1-17	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 December 2023	Examiner Hix, Rebecca
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



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5

10

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30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	C. SPIESS ET AL: "Development of a Human IgG4 Bispecific Antibody for Dual Targeting of Interleukin-4 (IL-4) and Interleukin-13 (IL-13) Cytokines", JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 288, no. 37, 13 September 2013 (2013-09-13), pages 26583-26593, XP055116683, ISSN: 0021-9258, DOI: 10.1074/jbc.M113.480483 * page 26584, left-hand column, paragraph 2 - paragraph 4 *	1-17	TECHNICAL FIELDS SEARCHED (IPC)
A	WO 2014/144299 A2 (ABBVIE INC [US]) 18 September 2014 (2014-09-18) * claims; examples *	1-17	
A,D,P	WO 2016/116626 A1 (SANOFI SA [FR]) 28 July 2016 (2016-07-28) * examples; table 1; sequences 135,138,140,141 *	1-17	
A	US 2014/213772 A1 (GHAYUR TARIQ [US] ET AL) 31 July 2014 (2014-07-31) * page 2, left-hand column, paragraph [0015]; figure 1 *	1-17	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 December 2023	Examiner Hix, Rebecca
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014116846 A2	31-07-2014	EP 2948475 A2	02-12-2015
		US 2014242077 A1	28-08-2014
		WO 2014116846 A2	31-07-2014

WO 2012135345 A1	04-10-2012	AR 085726 A1	23-10-2013
		AR 124511 A2	05-04-2023
		AR 124512 A2	05-04-2023
		AR 124513 A2	05-04-2023
		AU 2012236603 A1	18-04-2013
		BR 112013024758 A2	10-07-2018
		BR 122020011291 B1	14-06-2022
		BR 122022004041 B1	06-12-2022
		CA 2831603 A1	04-10-2012
		CL 2018001827 A1	31-08-2018
		CN 103562221 A	05-02-2014
		CN 110256568 A	20-09-2019
		CN 110256569 A	20-09-2019
		CO 6781527 A2	31-10-2013
		CY 1118807 T1	10-01-2018
		DK 2691416 T3	05-09-2016
		DK 3199547 T3	08-02-2021
		EP 2691416 A1	05-02-2014
		EP 3112380 A1	04-01-2017
		EP 3199547 A1	02-08-2017
		EP 3805262 A1	14-04-2021
		ES 2588306 T3	02-11-2016
		HR P20161030 T1	21-10-2016
		HU E028230 T2	28-12-2016
		IL 261673 A	31-10-2018
		IL 261674 A	31-10-2018
		IL 299392 A	01-02-2023
		JP 6023172 B2	09-11-2016
		JP 6490038 B2	27-03-2019
		JP 6877371 B2	26-05-2021
		JP 7003101 B2	04-02-2022
		JP 7273135 B2	12-05-2023
		JP 2014511684 A	19-05-2014
		JP 2017038607 A	23-02-2017
		JP 2018087211 A	07-06-2018
		JP 2020058363 A	16-04-2020
		JP 2022046668 A	23-03-2022
		JP 2023100752 A	19-07-2023
		KR 20140019420 A	14-02-2014
		KR 20210042183 A	16-04-2021
		LT 2691416 T	12-09-2016
		MA 35051 B1	03-04-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		MX 338907 B	05-05-2016
		MY 164906 A	15-02-2018
		NZ 616174 A	30-10-2015
		PL 2691416 T3	30-11-2016
		PL 3199547 T3	14-06-2021
		PT 2691416 T	26-08-2016
		RU 2013147821 A	20-05-2015
		SG 193916 A1	29-11-2013
		SI 3199547 T1	31-03-2021
		TW 201302786 A	16-01-2013
		TW 201722988 A	01-07-2017
		TW 201808994 A	16-03-2018
		TW 201940510 A	16-10-2019
		TW 202212358 A	01-04-2022
		TW 202317615 A	01-05-2023
		US 2012251541 A1	04-10-2012
		US 2013345404 A1	26-12-2013
		US 2014011238 A1	09-01-2014
		US 2014056895 A1	27-02-2014
		US 2016200811 A1	14-07-2016
		US 2018155450 A1	07-06-2018
		US 2021189011 A1	24-06-2021
		UY 33983 A	31-10-2012
		WO 2012135345 A1	04-10-2012
		ZA 201307017 B	28-05-2014
EP 1378520	A1	07-01-2004	CA 2443705 A1
			24-10-2002
			CN 1380341 A
			20-11-2002
			EP 1378520 A1
			07-01-2004
			JP 2005501517 A
			20-01-2005
			RU 2355705 C2
			20-05-2009
			US 2005175606 A1
			11-08-2005
			WO 02083738 A1
			24-10-2002
EP 1736484	A1	27-12-2006	AT E483731 T1
			15-10-2010
			CA 2561826 A1
			13-10-2005
			CN 1563092 A
			12-01-2005
			EP 1736484 A1
			27-12-2006
			ES 2351510 T3
			07-02-2011
			JP 4648382 B2
			09-03-2011
			JP 2007535915 A
			13-12-2007
			RU 2361878 C2
			20-07-2009
			US 2009117108 A1
			07-05-2009
			WO 2005095456 A1
			13-10-2005
WO 2011154453	A1	15-12-2011	CY 1122490 T1
			27-01-2021

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		DK 2580243 T3	13-01-2020
		EP 2580243 A1	17-04-2013
		EP 3613774 A1	26-02-2020
		JP 6093696 B2	08-03-2017
		JP 6609580 B2	20-11-2019
		JP 2013539352 A	24-10-2013
		JP 2017140025 A	17-08-2017
		JP 2020031654 A	05-03-2020
		JP 2022050388 A	30-03-2022
		LT 2580243 T	27-01-2020
		PL 2580243 T3	18-05-2020
		PT 2580243 T	22-01-2020
		SI 2580243 T1	28-02-2020
		US 2013209355 A1	15-08-2013
		US 2016237161 A1	18-08-2016
		US 2018298106 A1	18-10-2018
		US 2022204636 A1	30-06-2022
		WO 2011154453 A1	15-12-2011

WO 2017074878 A1	04-05-2017	AR 106466 A1	17-01-2018
		AU 2016347058 A1	14-06-2018
		BR 112018008011 A2	30-10-2018
		CA 3002664 A1	04-05-2017
		CL 2018001065 A1	23-11-2018
		CN 109311966 A	05-02-2019
		CN 116675776 A	01-09-2023
		CN 116789841 A	22-09-2023
		CN 117069855 A	17-11-2023
		CO 2018005337 A2	10-07-2018
		CR 20180288 A	11-09-2018
		DO P2018000102 A	30-11-2018
		EA 201891028 A1	28-02-2019
		EP 3365366 A1	29-08-2018
		EP 3819310 A1	12-05-2021
		ES 2894304 T3	14-02-2022
		HK 1253385 A1	14-06-2019
		HR P20211528 T1	24-12-2021
		HU E056608 T2	28-02-2022
		IL 258822 A	28-06-2018
		IL 301140 A	01-05-2023
		JP 7169190 B2	10-11-2022
		JP 7328267 B2	16-08-2023
		JP 2018537966 A	27-12-2018
		JP 2021072847 A	13-05-2021
		JP 2023085476 A	20-06-2023
		KR 20180063336 A	11-06-2018

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		MA 42641 A1	29-03-2019
		MY 192278 A	16-08-2022
		PE 20181167 A1	19-07-2018
		PH 12018500873 A1	12-11-2018
		PL 3365366 T3	31-01-2022
		SG 11201803324V A	30-05-2018
		SI 3365366 T1	28-02-2022
		TW 201730210 A	01-09-2017
		TW 202219064 A	16-05-2022
		US 2019054182 A1	21-02-2019
		US 2020054765 A1	20-02-2020
		US 2022226495 A1	21-07-2022
		UY 36965 A	31-05-2017
		WO 2017074878 A1	04-05-2017
WO 2015149077 A1	01-10-2015	AU 2015237184 A1	20-10-2016
		AU 2021201249 A1	15-04-2021
		BR 112016022385 A2	19-06-2018
		CA 2943621 A1	01-10-2015
		CL 2016002460 A1	11-05-2018
		CN 106471009 A	01-03-2017
		CN 111410691 A	14-07-2020
		CR 20160506 A	10-03-2017
		DK 3122781 T3	16-03-2020
		EA 201691925 A1	30-06-2017
		EP 3122781 A1	01-02-2017
		EP 3699195 A2	26-08-2020
		EP 3954713 A2	16-02-2022
		ES 2775431 T3	27-07-2020
		HR P20200164 T1	01-05-2020
		HU E048734 T2	28-08-2020
		JP 6775422 B2	28-10-2020
		JP 7273016 B2	12-05-2023
		JP 2017511130 A	20-04-2017
		JP 2021000141 A	07-01-2021
		JP 2023052766 A	12-04-2023
		KR 20160136422 A	29-11-2016
		KR 20210097222 A	06-08-2021
		KR 20230022270 A	14-02-2023
		LT 3122781 T	25-03-2020
		ME 03666 B	20-10-2020
		PE 20161431 A1	22-01-2017
		PH 12016501908 A1	09-01-2017
		PL 3122781 T3	15-06-2020
		PT 3122781 T	05-03-2020
		SG 10202008629X A	29-10-2020

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		SG 11201607983Y A	28-10-2016
		SI 3122781 T1	31-03-2020
		TN 2017000532 A1	12-04-2019
		UA 119167 C2	10-05-2019
		US 2015307629 A1	29-10-2015
		US 2018094079 A1	05-04-2018
		US 2021309762 A1	07-10-2021
		WO 2015149077 A1	01-10-2015

WO 2009149189 A2	10-12-2009	AR 072001 A1	28-07-2010
		AU 2009256250 A1	10-12-2009
		BR PI0913406 A2	09-01-2018
		CA 2726087 A1	10-12-2009
		CL 2010001427 A1	15-07-2011
		CN 102112495 A	29-06-2011
		CO 6331347 A2	20-10-2011
		CR 11837 A	12-01-2011
		DO P2010000368 A	15-02-2011
		EC SP10010644 A	28-02-2011
		EP 2297209 A2	23-03-2011
		EP 3002299 A1	06-04-2016
		JP 2011523853 A	25-08-2011
		KR 20110016958 A	18-02-2011
		NZ 589434 A	30-11-2012
		PE 20100092 A1	12-03-2010
		RU 2010153580 A	20-07-2012
		SG 191639 A1	31-07-2013
		TW 201008580 A	01-03-2010
		US 2009311253 A1	17-12-2009
		US 2014335014 A1	13-11-2014
		US 2015315283 A1	05-11-2015
		UY 31862 A	05-01-2010
		WO 2009149189 A2	10-12-2009
		ZA 201008560 B	28-05-2014

US 2010226923 A1	09-09-2010	AR 068861 A1	09-12-2009
		AR 122833 A2	12-10-2022
		AR 122834 A2	12-10-2022
		AU 2008312655 A1	23-04-2009
		AU 2013202389 A1	02-05-2013
		AU 2013203324 A1	02-05-2013
		AU 2013203328 A1	02-05-2013
		AU 2013203339 A1	02-05-2013
		BR PI0818677 A2	14-04-2015
		CA 2702473 A1	23-04-2009
		CA 3015470 A1	23-04-2009

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		CA 3071750 A1	23-04-2009
		CL 2008003037 A1	06-03-2009
		CL 2012003196 A1	25-01-2013
		CL 2013002039 A1	07-03-2014
		CL 2013002040 A1	24-01-2014
		CN 101827863 A	08-09-2010
		CN 106986938 A	28-07-2017
		CN 113480647 A	08-10-2021
		CR 11337 A	21-04-2010
		CR 20150101 A	14-04-2015
		CR 20150102 A	30-04-2015
		CR 20150103 A	14-04-2015
		CR 20150654 A	08-02-2016
		CY 1114987 T1	14-12-2016
		CY 1119875 T1	27-06-2018
		CY 1120033 T1	12-12-2018
		CY 1120108 T1	12-12-2018
		CY 1120887 T1	11-12-2019
		DK 2205640 T3	24-02-2014
		DK 2573119 T3	16-04-2018
		DK 2573121 T3	04-12-2017
		DK 2574629 T3	26-02-2018
		DK 2574630 T3	30-07-2018
		DO P2010000109 A	31-05-2010
		DO P2013000301 A	16-02-2014
		DO P2013000302 A	16-02-2014
		EP 2050764 A1	22-04-2009
		EP 2205640 A2	14-07-2010
		EP 2573115 A1	27-03-2013
		EP 2573116 A1	27-03-2013
		EP 2573117 A1	27-03-2013
		EP 2573118 A1	27-03-2013
		EP 2573119 A1	27-03-2013
		EP 2573121 A1	27-03-2013
		EP 2574626 A1	03-04-2013
		EP 2574629 A1	03-04-2013
		EP 2574630 A1	03-04-2013
		EP 3686220 A1	29-07-2020
		ES 2447915 T3	13-03-2014
		ES 2647872 T3	27-12-2017
		ES 2660152 T3	21-03-2018
		ES 2664476 T3	19-04-2018
		ES 2679281 T3	23-08-2018
		GT 201000067 A	12-04-2012
		HN 2010000710 A	22-07-2013
		HR P20140150 T1	28-03-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		HR P20171765 T1	29-12-2017
		HR P20180320 T1	06-04-2018
		HR P20180517 T1	04-05-2018
		HR P20181085 T1	07-09-2018
		HU E036530 T2	30-07-2018
		HU E037205 T2	28-08-2018
		HU E038444 T2	29-10-2018
		HU E038556 T2	29-10-2018
		IL 205005 A	30-11-2016
		JP 5858616 B2	10-02-2016
		JP 6126652 B2	10-05-2017
		JP 6126653 B2	10-05-2017
		JP 6280526 B2	14-02-2018
		JP 2011501671 A	13-01-2011
		JP 2015231382 A	24-12-2015
		JP 2016006086 A	14-01-2016
		JP 2016006087 A	14-01-2016
		JP 2018078907 A	24-05-2018
		KR 20100067669 A	21-06-2010
		KR 20140112574 A	23-09-2014
		KR 20160142889 A	13-12-2016
		KR 20180014189 A	07-02-2018
		KR 20190022928 A	06-03-2019
		LT 2573119 T	10-04-2018
		LT 2573121 T	11-12-2017
		LT 2574629 T	12-03-2018
		LT 2574630 T	25-07-2018
		MA 31838 B1	01-11-2010
		MX 354150 B	15-02-2018
		MX 354666 B	15-03-2018
		MX 363634 B	28-03-2019
		MX 363638 B	28-03-2019
		MX 363901 B	08-04-2019
		MY 171214 A	02-10-2019
		NI 201000040 A	07-09-2010
		NI 201000401 A	07-09-2010
		NI 201000402 A	07-09-2010
		NI 201000403 A	07-09-2010
		NI 201000404 A	07-09-2010
		NI 201000405 A	07-09-2010
		NI 201000406 A	07-09-2010
		NO 2573121 T3	20-01-2018
		NO 2574629 T3	21-04-2018
		NZ 584658 A	31-08-2012
		NZ 601342 A	28-02-2014
		NZ 709353 A	29-06-2018

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		NZ 729148 A	24-12-2021
		PA 8799001 A1	23-07-2009
		PE 20091382 A1	14-10-2009
		PH 12013501032 A1	18-05-2015
		PH 12013501033 A1	25-05-2015
		PL 2205640 T3	30-05-2014
		PL 2573119 T3	31-07-2018
		PL 2573121 T3	31-01-2018
		PL 2574629 T3	30-05-2018
		PL 2574630 T3	28-09-2018
		PT 2205640 E	25-02-2014
		PT 2573119 T	04-04-2018
		PT 2573121 T	21-11-2017
		PT 2574629 T	23-02-2018
		PT 2574630 T	17-07-2018
		RS 53175 B	30-06-2014
		RU 2010119521 A	27-11-2011
		RU 2013120318 A	10-11-2014
		RU 2015141418 A	04-04-2017
		RU 2015141428 A	04-04-2017
		SG 185303 A1	29-11-2012
		SG 10201602770U A	30-05-2016
		SG 10201913836S A	30-03-2020
		SG 10201913838R A	30-03-2020
		SI 2205640 T1	30-04-2014
		SI 2573119 T1	31-05-2018
		SI 2573121 T1	31-01-2018
		SI 2574629 T1	30-03-2018
		SI 2574630 T1	31-08-2018
		TN 2010000126 A1	26-09-2011
		TR 201802225 T4	21-03-2018
		TR 201810005 T4	27-08-2018
		TW 200932263 A	01-08-2009
		TW 201536321 A	01-10-2015
		TW 201536322 A	01-10-2015
		TW 201825117 A	16-07-2018
		UA 104130 C2	10-01-2014
		UA 118949 C2	10-04-2019
		US 2010226923 A1	09-09-2010
		US 2013209469 A1	15-08-2013
		US 2013236460 A1	12-09-2013
		US 2013236461 A1	12-09-2013
		US 2013236462 A1	12-09-2013
		US 2013236463 A1	12-09-2013
		US 2013243776 A1	19-09-2013
		US 2013243777 A1	19-09-2013

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 23 17 9697

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2013243778 A1	19-09-2013
		US 2013251716 A1	26-09-2013
		US 2013251717 A1	26-09-2013
		US 2013251718 A1	26-09-2013
		US 2013259866 A1	03-10-2013
		US 2014023649 A1	23-01-2014
		US 2018030156 A1	01-02-2018
		US 2021047437 A1	18-02-2021
		US 2023235088 A1	27-07-2023
		UY 31394 A1	29-05-2009
		WO 2009052081 A2	23-04-2009
		ZA 201002069 B	29-12-2010

WO 2014144299 A2	18-09-2014	AR 095588 A1	28-10-2015
		AU 2014227664 A1	24-09-2015
		BR 112015023557 A2	24-10-2017
		CA 2904407 A1	18-09-2014
		CL 2015002743 A1	18-03-2016
		CN 105209491 A	30-12-2015
		CR 20150522 A	12-01-2016
		EC SP15040888 A	30-11-2015
		EP 2970457 A2	20-01-2016
		JP 2016517277 A	16-06-2016
		KR 20150131360 A	24-11-2015
		PE 20151670 A1	12-12-2015
		PH 12015502007 A1	11-01-2016
		RU 2015143833 A	21-04-2017
		SG 11201507423Y A	29-10-2015
		TW 201446800 A	16-12-2014
		US 2014271457 A1	18-09-2014
		UY 35479 A	30-09-2014
		WO 2014144299 A2	18-09-2014
		ZA 201506582 B	25-01-2017

WO 2016116626 A1	28-07-2016	AR 103488 A1	10-05-2017
		AU 2016210068 B2	28-10-2021
		AU 2022200467 A1	17-02-2022
		BR 112017014805 A2	09-01-2018
		CA 2974453 A1	28-07-2016
		CL 2017001866 A1	27-04-2018
		CL 2018002490 A1	26-07-2019
		CN 107428835 A	01-12-2017
		CN 114230667 A	25-03-2022
		CN 114230668 A	25-03-2022
		CO 2017008462 A2	16-01-2018
		CR 20170383 A	22-11-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 23 17 9697

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		DO P2017000160 A	15-08-2017
		EA 201791666 A1	30-11-2017
		EC SP17054182 A	30-11-2017
		EP 3247725 A1	29-11-2017
		EP 3812398 A2	28-04-2021
		EP 4039710 A2	10-08-2022
		ES 2824167 T3	11-05-2021
		GT 201700162 A	24-10-2018
		HR P20201517 T1	11-12-2020
		HU E052011 T2	28-04-2021
		IL 299975 A	01-03-2023
		JP 6817211 B2	20-01-2021
		JP 7269215 B2	08-05-2023
		JP 2018513831 A	31-05-2018
		JP 2021072784 A	13-05-2021
		JP 2023093625 A	04-07-2023
		KR 20170101311 A	05-09-2017
		LT 3247725 T	12-10-2020
		MA 40801 A1	31-07-2018
		MY 191964 A	21-07-2022
		NZ 734803 A	31-03-2023
		PE 20171764 A1	21-12-2017
		PH 12017501190 A1	18-12-2017
		PL 3247725 T3	11-01-2021
		PT 3247725 T	07-10-2020
		SG 10201906762Y A	27-09-2019
		SG 11201705925P A	30-08-2017
		SI 3247725 T1	30-11-2020
		TN 2017000275 A1	19-10-2018
		TN 2018000324 A1	16-01-2020
		TN 2018000325 A1	16-01-2020
		TW 201639885 A	16-11-2016
		TW 202130662 A	16-08-2021
		UA 126269 C2	14-09-2022
		US 2018057597 A1	01-03-2018
		US 2018222987 A1	09-08-2018
		US 2021292423 A1	23-09-2021
		UY 36536 A	31-08-2016
		WO 2016116626 A1	28-07-2016
US 2014213772	A1	31-07-2014	NONE

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82